Mintz, Sidney W., and Eric R. Wolf. "An Analysis of Ritual Co-Parenthood (Compadrazgo)." In *Friends, Followers and Factions: A Reader in Political Clientelism*. Edited by Steffen W. Schmidt et al., pp. 1–15. Berkeley: University of California Press, 1977.

Mitterauer, Michael. "European Kinship Systems and Household Structures: Medieval Origins." In *Distinct Inheritances: Property, Family and Community in a Changing Europe*. Edited by Hannes Grandits and Patrick Heady, pp. 35–51. Münster: LIT Verlag, 2003.

———. "A 'European Family' in the Nineteenth and Twentieth Centuries?" In *The European Way*. Edited by Hartmut Kaelble, pp. 140–60. New York, Oxford: Berghahn Books, 2004.

Mooser, Josef. *Ländliche Klassengesellschaft, 1770–1848: Bauern Und Unterschichten, Landwirtschaft Und Gewerbe im oÖstlichen Westfalen*. Kritische Studien zur Geschichtswissenschaft 86. Göttingen: Vandenhoek & Ruprecht, 1984.

Munno, Christina. "Prestige, Intégration, Parentèle: Les Réseaux De Parrainage Dans Une Communauté De Vénétie (1834–1854)." *Annales de Démographie Historique* 109, no. 1 (2005): pp. 95–130.

Nooy, Wouter de, Andrej Mrvar, and Vladimir Batagelj. *Exploratory Social Network Analysis with Pajek*. Cambridge: Cambridge University Press, 2005.

Parsons, Talcott. "The Kinship System of the Contemporary United States." *American Anthropologist* 45, no. 1 (1943): pp. 22–38. doi:10.1525/aa.1943.45.1.02a00030.

Pfister, Ulrich, Johannes Bracht, Christine Fertig, and Georg Fertig. "Life Course Strategies, Social Networks, and Market Participation in Nineteenth-Century Rural Westphalia: An Interpretative Essay." In *Social Networks, Political Institutions, and Rural Societies*. Edited by Georg Fertig, pp. 89–124. Rural History in Europe 11. Turnhout: Brepols Publishers, 2015.

Sabean, David W. *Property, Production, and Family in Neckarhausen, 1700–1870*. Cambridge Studies in Social and Cultural Anthropology 73. Cambridge: Cambridge University Press, 1990.

———. *Kinship in Neckarhausen, 1700–1870*. Cambridge: Cambridge University Press, 1998.

Sabean, David W., Simon Teuscher, and Jon Mathieu. *Kinship in Europe: Approaches to Long-Term Development (1300–1900)*. New York, Oxford: Berghahn Books, 2007.

Schnegg, Michael, and Douglas R. White. "Getting Connected: Kinship and Compadrazgo in Rural Tlaxcala, Mexiko." In *Networks, Resources and Economic Action*. Edited by Clemens Greiner and Waltraud Kokot, pp. 37–52. Kulturanalysen 9. Berlin: Dietrich Reimer Verlag, 2009.

Schweizer, Thomas. *Muster sozialer Ordnung. Netzwerkanalyse als Fundament der Sozialethnologie*. Berlin: Reimer Dietrich, 1996.

Segalen, Martine. *Fifteen Generations of Bretons: Kinship and Society in Lower Brittany 1720–1980*. Cambridge: Cambridge University Press, 1991.

White, Douglas R. "Structural Endogamy and the Network, Graphe De Parenté." *Mathématiques et sciences humaines* 137 (1997): pp. 101–25.

White, Douglas R., and Ulla Johansen. *Network Analysis and Ethnographic Problems: Process Models of a Turkish Nomad Clan*. Lanham u.a.: Lexington Books, 2005.

2.6 Mobility and movements in intellectual history

A social network approach

Christophe Verbruggen, Hans Blomme and Thomas D'haeninck

An actor-centred approach in intellectual history

It appears to be a great moment to be a scholar of intellectual history. The digitisation of documents, the availability of digital bibliographies, new digital tools and an abundance of data available online offer exciting new prospects.[1] With the increasing availability of both structured and unstructured digital data and the dissemination of relatively user-friendly tools and applications, it has become quite easy to analyse and visualize complex phenomena in a perceptive way. The loss of heuristic barriers facilitates the formal use of particular scientific methodologies, such as social network analysis (SNA), which is no longer predominantly used as a metaphor in historical research. Its concepts and methods have increasingly found their way into the historian's practice. However, as often in Digital Humanities, scholars sometimes tend to apply SNA methods without fully realising their theoretical implications or without starting out from research questions. Understanding whether and how networks can advance the understanding of data, without creating artificial complexity, is crucial.[2]

In this chapter we will illustrate (and temper) certain expectations with regard to network analysis and spatial methods by applying them to a historical case from our ongoing digital research project TIC Collaborative. Our global objective in this project is to understand the multiple meanings behind and effects of temporary (cultural) mobility, in particular the visits, exchanges, journeys and congress participation of students, lecturers, experts, scientists, activists et. in the long 19th century.[3] We focus on the involvement of social, legal and educational reformers and other kinds of socio-political activists from the Low Countries in (temporary) transnational intellectual networks on the one hand and their activities at home on the other hand. Mobility patterns are related with the capability and opportunity structures (like family, education, social status, gender, religion, ethnicity or capital) on which individuals or groups depend for their spatial and social mobility. In this chapter we will show how social network analysis can help us to interpret our complex (historical) information in a variety of ways, such as pattern identification (e.g. tracing clusters) or as a data reduction technique.[4] Next to our relational (network) approach, we cannot overlook the clear spatial component of transnational (intellectual) mobility. Spatial history has become an important means of doing research.[5] Mapping

and plotting networks geographically provides scholars a way of exploring data in order to come up with new questions and unexpected findings. Many projects in the arts and humanities include a spatial and/or visual component, often making use of web-based research platforms and graphical interfaces.

As we stressed, it's critical for scholars to know how networks can support and enhance their research. Before we can develop some concrete network perspectives in the third section of this chapter, we will expand in the second section more broadly on how we use SNA to study intellectual mobility and (the dynamics of) intellectual and social movements. We propose an actor-oriented approach and focus on the cultural processes of communicative interaction that constitute the relevant networks, combining insights from the sociology of ideas, the history of science and the literature on (social) movements, in order to explain the dynamics of scientific and intellectual movements.[6]

One way to get a grip on cultural (ex-)change is the analysis of the contact zones where cultural goods (ideas, experiences, publications etc.) are exchanged and how these "intercultural spaces" are used.[7] Mobilities can be seen as cross-border movements of persons, objects, texts and ideas, both hidden as well as conspicuous. But, how can we trace the mobility of people and ideas in the spheres of politics and science? The social network approach is indeed highly applicable to the study of intellectuals, activists and their cognitive horizons because they are almost by definition active and "audacious" within network structures.[8] Promising is the identification of intermediary persons, a selected group of "mobilisers" (using the word recently coined by Stephen Greenblatt[9]) who are creators of social or political change in society through cultural means.

By interconnecting social units through social relationships, networks offer a flexible way to deal with cultural and social transfers, which are difficult to contain within specific boundaries, whether those boundaries are local or the boundaries of nation-states.[10] Whereas comparison is essentially synchronic, a focus upon transfer is diachronic. As regards the particular case of Transfergeschichte, however, such studies have often favoured the analysis of bilateral transfers. Critical of these shortcomings and its relationship with the nation or national history, Michael Werner and Benedicte Zimmermann[11] have introduced the perspective of "histoire croisée". They propose a reflexivity that "asks that historians understand their categories of analysis as well as their objects of study, as 'entangled products' of national crossings". Certainly, relational approaches cannot always capture the complex entities that are the product or the root of transnational processes – but formal network analysis certainly has the potential to foster empirical research and to make sense of the wide array of possibilities and source material that historians work with.[12]

Although transnational history traverses other fields such as political-institutional history (with a focus on political entities, organisations and movements), economic history (with a focus on businesses, commodity chains etc.), cultural, literary and artistic history and many other (sub)disciplines, it focuses on the people who forge connections and entanglements.[13] The network concept and the transnational paradigm were jointly elaborated in the work of

Margaret Keck and Kathryn Sikkink,[14] who launched their discussion of contemporary "transnational advocacy networks" by considering anti-slavery movements in the late 18th and early 19th centuries. They studied actors with shared values or purposes that were conceived or portrayed as universal: human rights, environmental problems, educational and social reform. From a long-term perspective, these are recurring and sometimes interrelated objectives highlighted in the "history of transnational issue networks".[15] Such networks were carriers for the import, transformation and export of ideas and practices to a new context. Although Keck and Sikkink did not use formal network analysis, their approach offers a good theoretical starting point for a deeper exploration of 19th-century intellectual mobility and movements.

Movement perspectives and collective action

In the 19th and 20th century, scientific, intellectual and artistic movements coincided with the rise of social movements and shared their underlying goal of fundamental social and cultural change. Both social and intellectual movements can be approached from a relational point of view. In this we endorse Frickel and Gross,[16] who suggested (see also Cuyala[17]). Interrelated objectives, movement dynamics and mobilisation structures can for instance be related to the so called "framing" of meanings, ideas and issues in different settings.[18] This approach ties in with the so-called new sociology of ideas,[19] in that the ideas circulating will be linked to and analysed in the context of the micro-, meso- and macrosocial and -historical contexts in which they are embedded. As Crossley[20] argued, the point of sociological analysis in general and SNA in particular is to get beneath the appearance of randomness to reveal the pattern and posit its explanation. Therefore, scholars aim to identify "mechanisms" that appear to constrain actors, afford them opportunities and/or exert a steering effect on the course of interactions.[21]

A longitudinal, relational approach towards the dynamics of intellectual movements may start by analysing multiple memberships, thus showing the evolution of networks and organisational exchanges.[22] They have been used several times as an indicator for the study of cultural transfers such as knowledge exchange, for instance by Rosenthal et al. who managed to create a genealogy of causes in the 19th century for New York State, focusing on the multiple memberships of women active in social reform movements.[23] In this pioneering study, biographical dictionaries were used to map the affiliations between women and organisations between 1840 and 1914. Not the interconnections between the women – but the interconnections between the organisations – were the primary subject of their study. The number of mutual members or joint ties allowed the authors to make clusters of women's reform organisations. Their analysis not only revealed a genealogy of causes but also allowed them to identify central and intermediary actors or "brokers", core/periphery structures and ultimately also differences between the organisational structure and cultures of 1848 and 1900.

Rosenthal et al. gave their visualizations a longitudinal dimension and plotted their results on a timeline. Integrating time and longitudinal change has always been crucial in historical network analysis. Strongly influenced by Bourdieus'[24] notion of "trajectory" (the series of positions successively occupied by an actor in the field), Giuffre argues that the status of the actors is defined by the relative positions of other actors to whom they are (indirectly) tied. Changes over time in a constantly shifting web of relationships indicate changes in status but from our perspective also changes in personal interests and, on a different level, also organisational change. Another good way to include and study network dynamics is the use of sequences or snapshots in time.[25, 26] If we want to capture change, we must take time seriously. We can do this by comparing and connecting snapshots. Snapshots implicitly imply that the actors and their ties have a start date and an end date. Bearing in mind that this is always somewhat arbitrary – even when we start from the actors' self-definitions of groups or networks – we add a clear temporal dimension to the development of networks and the interactions that form them.[27]

An excellent example of mapping the evolution of networks over time through the multiple memberships of activist cohorts (snapshots in time) is the book *Partisan Publics: Communication and Contention across Brazilian Youth Activist Networks*.[28] Drawing upon ethnography, as well as formal cluster methods, Mische combined information about events, organisations and individuals in a rare longitudinal network analysis of partisanship and civic associations in Brazilian youth politics in the eighties and nineties of the 20th century. Mische tracked the trajectories of five consecutive cohorts of youth activists through intersecting organisational clusters, such as the overlapping student movements and church-based activism. The underlying assumption is that overlapping relationships constitute a setting in which communication and meaningful interaction take place.

Co-presence at events is a related type of movement tie, in the sense that it builds on the same notion of the "duality of groups and persons". Diani and Mische stress the importance of the social settings in which discourses and alliances of movements are articulated.[29] Furthermore, they point out that events provide opportunities for previously disconnected groups to intermingle in the broad movement "public", which may lead to new connections, exchange of discourse and integration (or segmentation) of the field (see also Della Porta[30]). In fact, neither networks nor the settings in which they are performed are purely of a social nature. They are cultural as well. McLean[31] highlights three cultural elements that constitute networks: first he points to cultural tastes and worldviews, which are typically both influencing and reinforcing personal social networks in both directions. Closely related to this are the culturally informed competencies of social actors, which affect network formation, including both the use of cultural knowledge as well as the adoption of forms of interaction (such as etiquettes). Finally, McLean argues that cultural schemes (norms) can also affect how and with whom actors are willing to interact. Furthermore, spaces in which social events take place, themselves performative and relational

constructions, can be bearers of culturally valuable resources. They have their own regularities, which cover the interaction and define what kind of cultural practices can be articulated (and which cannot).[32]

Movements are formed through multiple types of ties. Next to co-membership and co-presence, also co-authorship (which can be understood as a specific form of a shared project) and obviously direct relationships between actors can be perceived as such. To study movement dynamics, ideally, the interplay of multiple types should be taken into account.[33] Moreover, von Bülow argues that focussing on relations as perceived by the actors themselves can in certain cases be a more fruitful scientific approach than using formally existing relations.[34] It is true that, for example, co-presence or co-membership are not necessarily detectors of network ties, as perceived by actors themselves, as they do not typically say anything about an actor's actual behaviour in a movement, nor about his role or importance in it.[35] Taking this into account, several empirical studies have shown that these types of ties can prove to be meaningful relations for constituting networks. Organisations, events and publications can all be addressed as social aggregates or types of sociability. If the same person contributed to or participated in two organisations, events or publications, we can assume that they have something to do with each other (albeit not necessarily directly).

Empirical research has proven that network structure cannot be underestimated as a determining factor of the dynamics of movements.[36] In a formal network analysis we can subsequently measure network cohesion on the subgroup or individual level (centrality). The location of individual actors and centrality in networks can also be described in terms of cliques or subgroups. A given actor can connect different groups, while others can be isolated. In a next step, basic properties of whole networks, such as size and density, can also apply to the cohesive groups in a network. Since the definition of a clique insists that every member of a subgroup has a direct tie with each and every other member, this strict definition is often not suitable for historical research. Cluster analysis is probably the most accurate technique for finding subgroups within networks, as it takes into account the strength of the relationship between actors. However, when we look at it closely, most clustering techniques, such as hierarchical clustering, are not based on a cohesive approach. The cohesive group approach differs fundamentally from the "structural equivalent" approach. Actors who are structurally equivalent (not equivalent in general) can be connected to the same actors or can have similar ties without being connected themselves. Members of two different cliques or groups can be structurally equivalent. Examples from historical SNA in which structural equivalence has been used are rare. A good example is the content analysis of letters written by Cicero.[37]

Hierarchical clustering analysis has a lot in common with multidimensional scaling (MDS), which is composed of methods for plotting the proximities between network actors and positions and is based on the use of both similarities and dissimilarities. The use of both methods results in an overlapping hierarchical pattern of groups and structures that can be graphically represented and have

to be interpreted by the researcher. The use of visually representing social networks has always had an important role in social network research. Network visualization improves the communication and potential significance of relational data and helps to explore network properties.[38] From the beginning of SNA, drawings of networks have been used both to discover insights in network structures and to communicate those insights to others.[39] SNA reflects the complexity of social structures and limits the risk of reductionism. As a result of visual persuasiveness, MDS can be very useful for the representation of relatively small networks. The procedure is based on the calculation of the shortest path from actor to actor. Actors in Figure 2.6.1 (symbolist journals) with stronger ties are placed closer to each other and vice versa. This does not imply that the visible strength is used as a basis for the calculation. The visible, direct strength of the relations between the actors, i.e., the number of shared authors, is indicated by the size (thickness) of the line.

This graphical exploration allowed us to distinguish social groups and clusters. The research questions regarding the existence of regionalist literary subfields within the symbolist literary movement could be partially answered by reading the patterns of relations (publication patterns and clusters of journals). Although it does not correspond with actual geographical locations, it provides a sense of spatiality, with a concentration of periodicals in Brussels (around *La Jeune Belgique*) and Paris (around *La Plume* and *Revue Blanche*) but also a

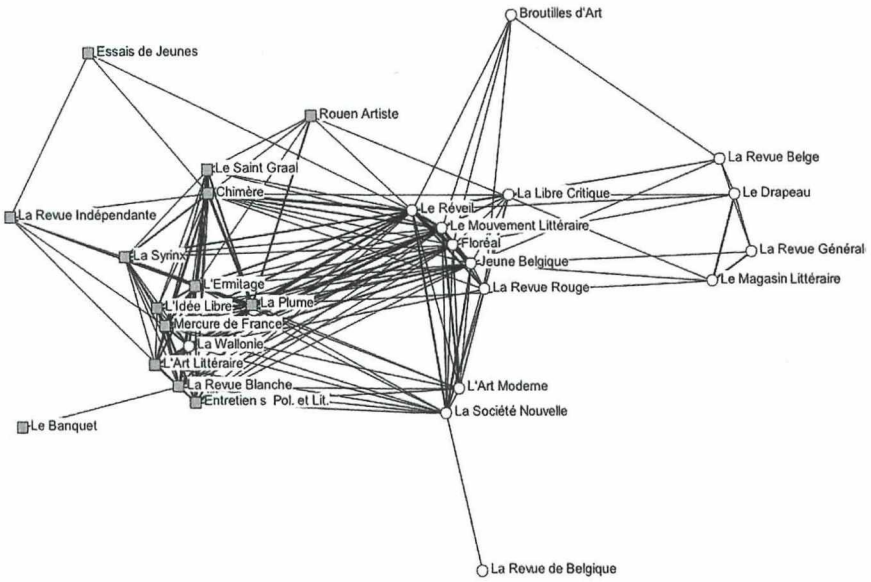


Figure 2.6.1 MDS-sociogram of Belgian and French literary journals 1892–93 (with at least three shared collaborators). The thickness of the line indicates the strength of the relationship (shared authors). Belgian journals are represented by white circles, French journals by grey squares. For a detailed interpretation, see: Laqua and Verbruggen.[40]

number of journals that were published in provincial towns and cities (notably *Chimère* and *Saint Graal*). Strikingly, the sociogram only partially reflects Belgium's socio-political divisions. However, the analysis also revealed new research issues, such as the close cooperation between Belgians (Le Réveil) and authors from the South of France (Chimère). These findings allow us to draw several conclusions regarding the French and Belgian literary field. For instance, it is evident that three Belgian Symbolist publications assumed a central position in literary exchanges, partly reflecting the aesthetic dominance of the Symbolist movement. The introduction of prosopography in combination with qualitative in-depth research would have been impossible without network analysis and graphical exploration. By reducing the complexity of the data, it was possible to identify relatively small social groups and central actors that are interesting for further research. At this stage, we have taken into account individuals with shared social attributes in a prosopography or group biography. In addition, empirical research based on personal documents such as memoirs, letters and diaries remained imperative for a more profound insight into the genesis of network structures. Thus, we advocate for an integrated approach that combines the use of qualitative methodologies, acknowledging the specificity and complexity of the multi-layered context, with formal network techniques that help detect patterns beyond the viewpoint of a given actor.[41]

The analysis of ego-networks or personal networks may also result in more in-depth knowledge about an object of study. The analysis of personal networks differs from a biography because it is a more systematic approach. For instance, in a co-authorship network, each author can be assigned as an ego, while co-authors or other contributors to the journals are the so called alters. Entire journals can also be assigned as an ego. The systematic analysis of structural properties of their network positions might reveal similarity or "homophily" between the ego and certain alters.[42] Also different from a more traditional biographical approach are the possibilities for graphical explorations. It is possible to measure structure within a personal network, but most analyses of personal network data "summarise the composition of the network as a set of variables" or social attributes.[43] Focussing on the relations around particular nodes not only offers a vast analytical added-value for research focussing on specific actors, but it also helps to overcome heuristic barriers, such as lack of (available) data and sources or, at the other end of the scale, an abundance of data on, for instance, network mobilisation in social movements.[44]

Science, expertise and activism: Belgian and Dutch 19th-century social reformers

In the following section we will illustrate our relational and actor-centred approach with a brief case study. Science, expertise and activism are domains of human activity that became increasingly international in the 19th and 20th centuries. This was, however, not a recent development but had been a feature of knowledge exchange since the early modern period (and before). The many recent and

ongoing research projects studying knowledge circulation and the dynamics of the Republic of Letters illustrate this very well.[45] What was new in international exchange was not so much exchange across borders but the establishment of these (national) borders from the 19th century. The emergence of the period of the "modern" nation state, national identities and cultures coincided with a rising mobility and increasing economic integration.[46] However, the 19th-century nation state is not the most relevant category for investigating science as a social construct. This is because people labelled as "experts" set in motion processes of knowledge exchange and transformation that ultimately fuelled social and cultural reform efforts. These were based on relationships of mutual recognition, support and mobility across boundaries with regard to the 19th- and 20th-century colonial empires, even on an inter- and intra-imperial scale.

Tensions between national interests and universal aspirations also affected people engaged in social causes and advocacy, which makes it all the more relevant to address questions about activists and their networks within a transnational dimension. For example, to what extent, and in which domains, have women entered the transnational sphere? Debates about the theory and practice of social reform were not only confined to the context of nation states (in the making), but there were also many transnational connections between reform-minded citizens. A shared sense of urgency and a belief in the possibility that society could be changed for the better made engaged citizens travel beyond borders and search for new ideas and best practices that could solve social tensions. During the 19th century, ideas, policies and practices circulated in numerous ways (visits, journals, correspondence, international gatherings, learned associations and the like) and thus gave rise to a social and discursive field related to social reform.[47] Issues engendered networks, also across national borders, which have been compared to a "nébuleuse réformatrice".[48]

We are primarily looking at participation in international reform congresses, which we assume to be a strong indicator of transnational international engagement and social activism. Jamison et al.[49] see social movements as temporary public spaces, as moments of collective creation that provide societies with ideas, identities and even ideals. International congresses do meet the criteria of such definitions. These gatherings of reform-minded elites, originating from many different countries, can be seen as laboratories of new expert knowledge.[50] In the absence of international (non)governmental organisations, international congresses were the most important form of "scientific internationalisation".[51] They were – par excellence – the sites where scientists, administrators, politicians, artists and others met and exchanged ideas. They were places, in other words, where "rooted cosmopolitans"[52] connected the local, the national and the global. As such we consider social reformers and experts as part of a global field of discourse and practice, without making rigid a priori distinctions between science, knowledge and expertise. Our main research interest is the internationalisation of the social question and the emergence and development of institutional ties, generated by multiple memberships of social reformers. Above all, we are looking for different and changing patterns of attending international congresses. The changing

web of relationships indicates changes in status but, from our perspective, also changes in personal interests and, as mentioned before, on a different level, also organisational change.

The central dataset we are using comes from TIC Collaborative, which is a Virtual Research Environment (VRE) for the study of 19th- and early 20th-century international organisations and (scientific) congresses.[53] The database contains biographical information of 20.000+ social reformers, activists and experts and their affiliations with international congresses and 400+ non-governmental international and transregional organisations founded before 1914. The VRE is powered by Nodegoat,[54] a web-based database management platform with a graphical interface. It is first and foremost well-suited for the spatial exploration of data in order to come up with new questions and unexpected findings. Nodegoat is primarily concerned with the creation and contextualisation of single objects that move through time and space, but queries and selections can also be made for network analysis outside Nodegoat or a multivariate analysis in the context of a prosopography.

In this case study, we focus on Belgian and Dutch participants in a large selection of thematically related international congresses between the first international congress on statistics held in Brussels in 1853 and the beginning of WWI in 1914. Nico Randeraad and Chris Leonards[55] have used the TIC VRE to conduct research on the congress visits of a wider selection of nationalities. We selected over 300 congresses with a direct or indirect focus on education, women's rights, moral and cultural reform. In total, 7,202 reformers originating from the Low Countries, who made 9,559 congress visits, are included in the dataset. 19th-century congresses can both be perceived as events as well as organisations. They were often a first step towards institutionalisation or functioned more or less as organisations by frequently providing a forum for experts to exchange their experiences and ideas. Co-presence or co-membership (as participants were often referred to as members) can be valuable ties to constitute a meaningful network, even knowing that they do not necessarily say something about an actor's actual behaviour within these networks as we argued earlier. The latent patterns in the transnational social reform network we want to visualize refer to Belgian and Dutch reformers clustered by shared congress visits.

We used a hierarchical clustering technique, which is a way to re-evaluate an entire network and to group actors together who share similar positions with regard to the totality of positions in the network. Our activists from the Low Countries visiting socio-cultural reform congresses were plotted in a two-step approach. First, our data was entered and pre-processed in Gephi. A projection technique, via the Jaroslav Kuchar's plugin, was used to convert the two-mode network (persons and congresses) to a hierarchically clustered one-mode network of congresses. Second, we calculated the network properties (degree centrality and modularity) in Gephi, which are visualized in Figure 2.6.2 via the size and colour of the nodes and vertices.

Figure 2.6.2 shows which congresses were visited by reformers from the Low Countries (central graph), which were not visited (49 congresses, black nodes,

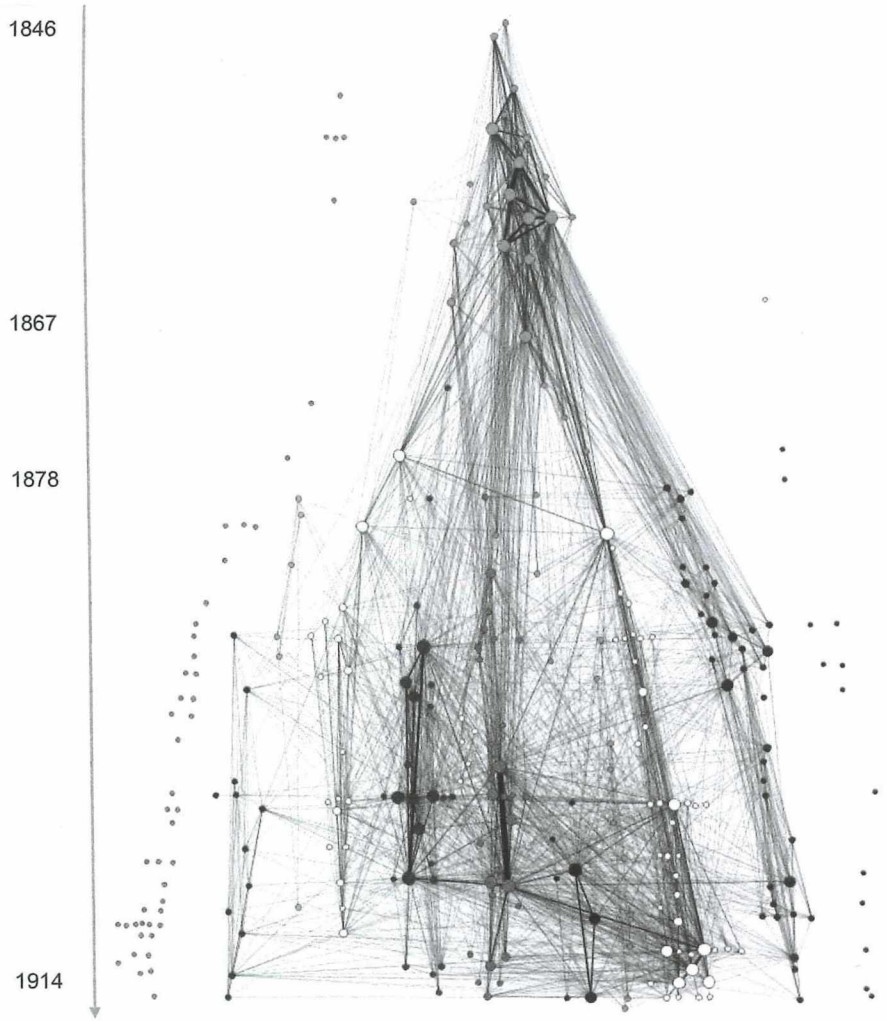


Figure 2.6.2 Socio-cultural reform congress linked by shared visits of Belgian and Dutch reformers, 1846–1914. Nodes: n = 293 congresses, size = number of visitors, colour = modularity class; Edges: n = 7542 shared visitors. Modularity classes: 11.[56]

plotted left) and isolated congresses who were visited by only a few reformers who did not visited other congresses (20 congresses, grey nodes, plotted right). All congresses are ordered chronologically with the oldest on top. The size of the nodes represents the number of Belgian and Dutch delegates each congress had (degree centrality). Although the isolates and pendants do influence the density of the network (0,063), we can clearly see a fairly connected graph,

indicating a rather strong presence of Low Country reformers in the network (both synchronically and diachronically), as well as strong shared patterns of congress visits. It is, however, important to note that the congresses that were visited the most, which strongly influence the network, were held in the Low Countries (over 30% of the congresses included in the selection) and were expected to attract larger numbers.

Clusters of co-presence at (or co-membership of) congresses (or congress series) give us a huge insight into the different "causes"[57] that actors (which can be either persons or organisations) were likely to share. As a means to identify these clusters, particular algorithms can be used to structure the network into several subgroups of densely interconnected nodes. An accepted model to calculate this modularity (the strength of division of a network) is the Louvain method for community detection.[58] Applying this algorithm to a specific dataset can help researchers to visually explore their networks and to come up with hypotheses that can be further researched and tested. In our case, modularity calculation means grouping those congresses together that were largely visited by the same Belgian and Dutch reformers. The colour of the nodes indicates the modularity class they belong to. Congresses who share a high amount of Dutch and Belgian participants will have the same colour and will be strongly connected to each other. The modularity structures the network into ten clusters, two before 1878 and eight after. The Paris World's Fair of 1878, which was a major catalyst for the internationalisation of the social question. More than 30 social reform congresses took place that year. For the congresses organised after 1878, the clusters group congresses together that were mainly dominated by liberals and others that were almost exclusively visited by Catholics. For the earlier congresses, the increase in the number of modularity classes follows the expanding network, which is an indicator of the process of specialisation and professionalisation of the fields of social and cultural reform. The narrow lines between the later congresses grouped in different modules indicate that, over time, groups of Belgians and Dutch who visited the same congresses (mostly held on the same or related themes) chose to ignore others, in contrast to the earlier congresses that were generally more strongly linked together (weighted network).

A good example of a cluster revealed by our analysis is a modularity class containing a large number of congresses organised between 1878 and the outbreak of the First World War. This cluster combines a group of congresses on freemasonry and education, with a peak around 1910–12, when five congresses were visited by many Belgians and Dutch and also strong patterns of shared congress visits can be seen. For example, the *Congrès international de l'education populaire* (1910, Brussels) had 49 visitors originating from the Low Countries in common with the *Congrès international de pédologie* (1911, Brussels). Several visitors, especially the prominent figures, can be associated with freemasonry, the *Ligue de l'enseignement belge* or the *Ligue belge des droits des femmes*. Within this "nébuleuse réformatrice", the locally rooted transnational women's movement and feminism occupied a central place, both institutionally, ideologically and in the framing of other issues.[59]

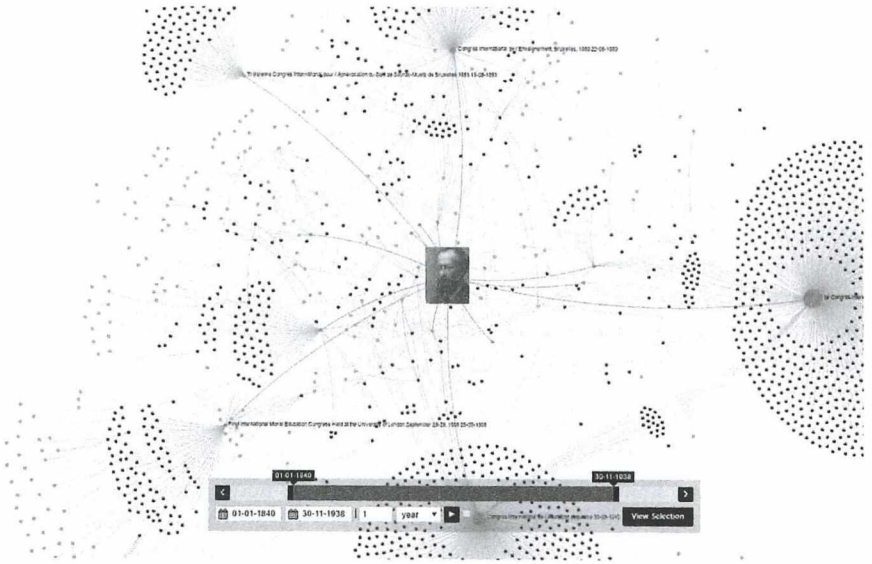


Figure 2.6.3 The personal network (co-membership and congress co-participation) of the Brussels-based educationalist Alexis Sluys (1849–1936). Dark grey nodes = congresses, black nodes = visitors, light grey nodes = organisations, size dark grey nodes = number of visitors. (Nodegoat visualization).

The personal network of educationalist Alexis Sluys (Figure 2.6.3) is a good illustration of a rooted cosmopolitan. The international affiliations in the network constituted a cognitive horizon rooted in local and national organisational milieus. He was not only an anticlerical freemason but also a member of the *Ligue de l'enseignement*, the Liberal Party and many other organisations. The frameworks he used to define different social issues and reform topics clearly echoed one another: "integral" education, the struggle against alcoholism, feminism, mixed freemasonry, secular ethics and "pedology" (the study of the physical and mental development of children).[60]

For the period between 1867 and 1878 the graph (Figure 2.6.2) indicates a stagnation of the ever-expanding network and the "strive for internationalism".[61] This period is also referred to as the transition between the first and second "peak of internationalism",[62] an abrupt but also temporary stop of international mobility mainly due to the Franco-Prussian War (1870–71). For the Belgian case, it has been suggested that the transition between the two periods also meant a transition between generations of congress attendees. Our analysis also confirms this for Dutch reformers. Only a small percentage of the delegates originating from the Low Countries visited both congresses before and after the period of 1878–80. This transition between generations of congress attendees is also reflected in a changing pattern of mobility. Before 1870, reformers originating from the Low Countries only visited congresses organised in the Low Countries, France, the

German States, the United Kingdom, Switzerland and Italy (see Figure 2.6.4). Between 1870 and 1878, a smaller number of conferences were visited, but after 1878 we can see a strong expansion of the mobility radius, as some participants even crossed the Atlantic. However, the strongest mobility is centred around Belgium due to the high number of congresses organised in Belgium between 1890 and WWI (Brussels, Liège and Antwerp).

If we want to understand the hidden mechanisms and internal coherence of groups in the network, we need to include social attributes in our analysis (such as religion, gender, profession, local affiliations). They enable us to explore the internal coherence of clusters in the network, detect divisions and factions and see meaningful trends in the presence or absence of specific social profiles. In other words, social attributes are an important step in interpreting the network and changing opportunity structures. We have to bear in mind that the sources (congress proceedings) our data set relies on do not provide us with a vast amount of biographical information about thousands of individual congress delegates who came from different places and had different socio-professional backgrounds.

Attributes that can be found in the sources include gender, nationality and often also profession and local affiliations (that can also serve as a relational attribute). A comparison between the presence of Dutch and Belgians on international congresses for instance shows that the rise and decline of the mobility of Belgians and Dutch follow a similar pattern, and also the shared patterns of

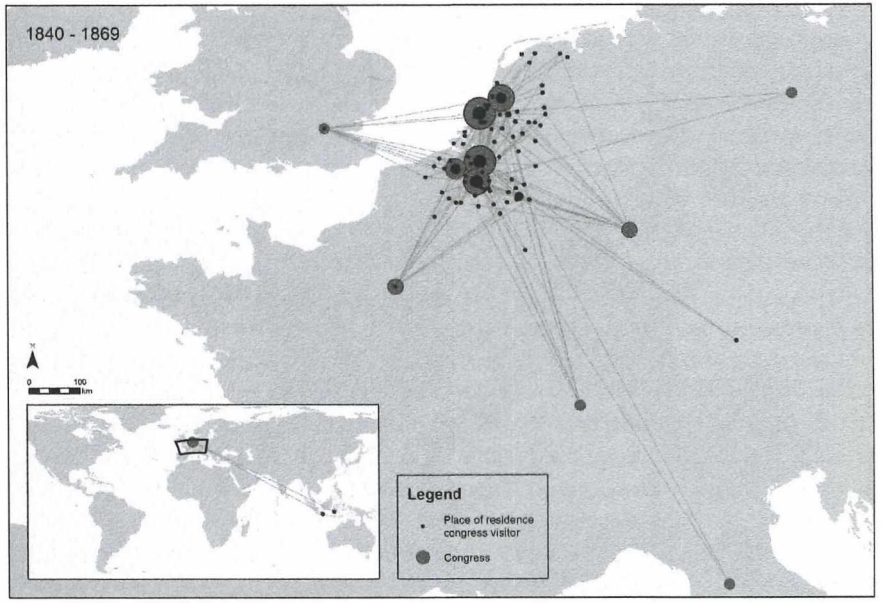
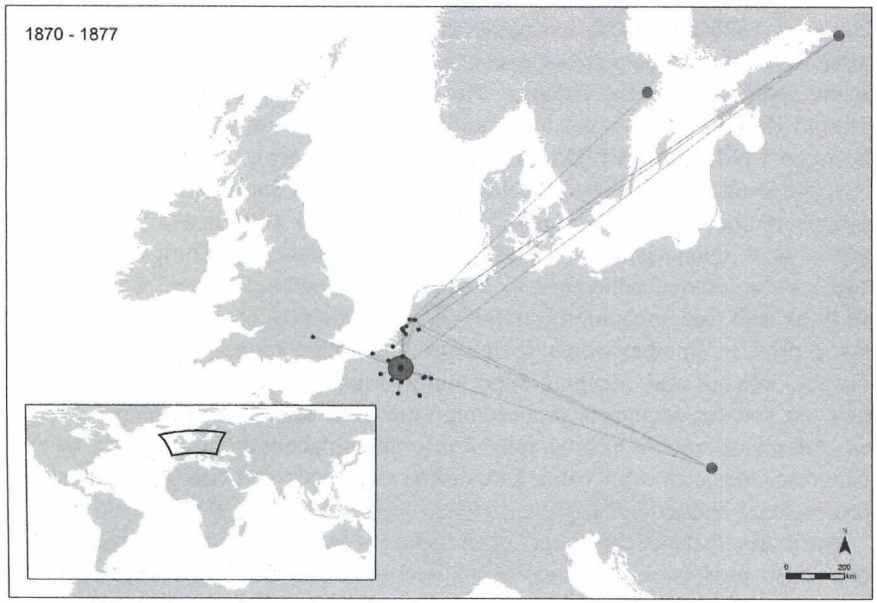


Figure 2.6.4 Congress mobility, 1840–1914.



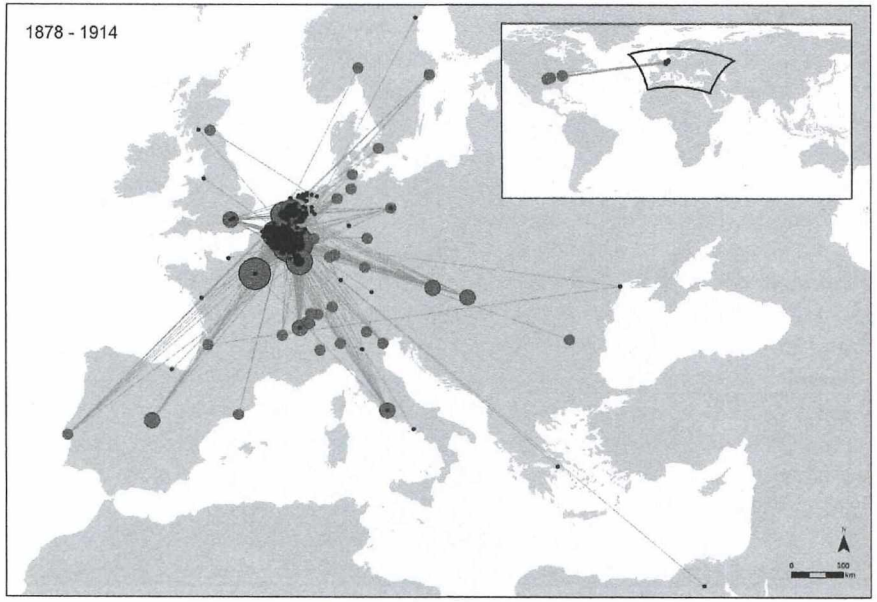


Figure 2.6.4 (*Continued*)

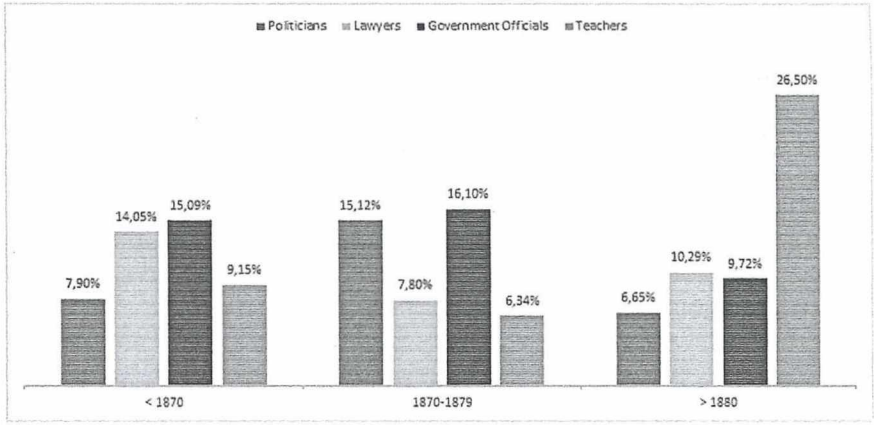


Figure 2.6.5 Known professions of Dutch and Belgian conference attendees, 1853–1914.

congress visits largely overlap. However, the increase of the number of Belgians after 1880 is quite significant and suggests a changing interest in these international gatherings. Furthermore, we can also look at the professions or occupations of the reformers.

In Figure 2.6.5 we compared four frequently occurring professions of Belgian and Dutch persons visiting international congresses, namely politicians, lawyers, government officials and teaching staff across the three periods (before 1870, between 1870 and 1879 and after 1880). The first three attributes only differ a little over the three periods; the most significant change is the strong increase in teaching staff after 1880. The fact that the professors, teachers, educators, instructors and people involved in re-education initiatives almost triple in the last period can be explained by the increasing importance of education at the international congresses, which were part of a wider dynamic of educational internationalism and growing cross-border dynamics between teaching professionals and educational organisations. We can thus trace and compare the professionalisation of welfare in the Low Countries. This illustrates very well the emergence of the "social engineer" and expert formation.

As highlighted before, describing and systematic mapping of the network in terms of centrality or connection presupposes the assumption that these patterns are meaningful. Interrelated objectives, movement dynamics and mobilisation structures can indeed be related to the framing of meanings and issues in different settings. For instance, the framing of temperance or pacifism as related to or sub-causes within the movement for women's rights. Explorative research into the composition of social networks, such as multiple memberships and shared authorship, does not suffice for answering complex research questions about changing discourse or the use of frames. Moreover, ideas and "meaning" (or semantics) are not only present in social networks but can also create such structures and sub-structures.[63]

For the actual analysis of the framing of social and cultural issues and for answering complex research questions about changing discourse, other sources and methods have to be used, such as the actual conference proceedings, publications and ego documents. In forthcoming research, we will analyse the correspondence of social reformers. Recent research has shown the potential of citation and network analysis of correspondence (collection of letters) for mapping and studying the structure of the intellectual field and the evolving conversations.[64] This approach ties in with research rooted in a "scientometric" analysis.[65] The co-occurrence of (title) words, keywords and co-authorship can, for instance, be connected with the author's social attributes and visualized[66] in order to get a grip on discursive changes.[67]

Conclusions

The evolution of networks over time, by tracing clusters in certain sequences or snapshots in time or assigning dates to ties and nodes to include a time dimension, is a good way to include and study network dynamics. Changes over time, in a constantly shifting web of relationships, indicate changes in status from a relational perspective but also changes in personal interests or organisational change. This approach ultimately reveals the relevant social circles in which the creation and circulation of ideas can be interpreted and understood. In our case study, social network analysis was used as a set of data-reduction techniques to summarise and visualize network data instead of formal modelling (as opposed to, for instance, Gould[68]). It has been argued before that this use of network tools does not provide an explanans, but an "interim explanandum", something that has to be explained instead of an explanation in itself. However, it can be very useful in a holistic methodological approach of social structure, social, cultural and intellectual dynamics.

It certainly is a good moment to be a digital historian. However, a lot of progress is still needed and can be expected. The most important change we are currently facing in the arts and humanities is a shift from an individual paradigm for humanities research to a collective one. This change is the result of an organic change in the humanities but is also due to external forces such as the rapid development of the internet, social media, user-friendly cloud solutions, etc.[69] However, this shift is far from complete. We are only slowly moving from a cooperative model towards a collaborative model. Many scholars are not yet taking full advantage of recent developments and the increasing numbers of collaborative visualization platforms facilitating both exploratory and more sophisticated analytical searches. Further infrastructural developments should coincide with the acceptance of a collaborative research paradigm of co-creation and participatory engagement. Early adopters of formal network methods in historical research highlighted the fact that SNA's data requirements are "formidable".[70] Notwithstanding the abundance of digitally available data, this has not changed fundamentally yet. Recent developments in computational linguistics, social network analysis and linked data technology are currently only partially

included in the previously mentioned platforms used by cultural and intellectual historians. Increasingly complex interlinked datasets are not yet matched with the right tools to query, annotate and explore them. The heuristic problems in finding "good data" that Bonnie Ericson mentioned are still imminent.[71] Many researchers tend to forget that missing data can result easily result in a high degree of distortion. The only way forward is (international) collaboration and the re-use of data that can be used for social network analysis.

We fully acknowledge the importance of data exploration, which may direct the researcher in a certain direction and may result in unexpected findings. Yet, on a more profound analytical level, social network analysis can only offer significant results when applied following clearly defined research questions and based on a thematically and spatially well-demarcated data collection. Network analysis methods in particular are relevant here as means to identify meaningful links and subgroups in datasets, to reveal shortest paths between entities such as persons and to point researchers in the direction of relevant entities by means of centrality measures and clustering algorithms.[72] Finally, graph visualizations offer powerful means to explore highly complex relational structures, which have hitherto been inaccessible for study. A network analysis should not only re-create network structures but also allow researchers to verify or trigger new research hypotheses.

Notes

1 Dan Edelstein, "Intellectual History and Digital Humanities," *Modern Intellectual History* 13, no. 1 (2016): pp. 237–46.
2 Claire Lemercier, "Formale Methoden der Netzwerkanalyse in den Geschichtswissenschaften: Warum und wie?," *Österreichische Zeitschrift für Geschichtswissenschaft* 23, no. 1 (2012): pp. 16–41.
3 See: www.tic.ugent.be. An earlier version of the description of our overall methodology, workflow and VRE can be found in D'haeninck, Randeraad and Verbruggen 2015. We would like to thank Nico Randeraad and Sally Chambers for their valuable comments.
4 Lemercier, 'Formale Methoden der Netzwerkanalyse in den Geschichtswissenschaften: Warum und Wie?'.
5 Richard White, "What Is Spatial History?," Stanford University Spatial History Project (2010), https://web.stanford.edu/group/spatialhistory/cgi-bin/site/pub.php?id=29 (accessed 6 February 2020).
6 Ann Mische, "Relational Sociology, Culture, and Agency," in Scott; Carrington, *The Sage Handbook of Social Network Analysis*, pp. 80–98.
7 Mary L. Pratt, "Arts of the Contact Zone," *Profession* (1991): pp. 33–40.
8 François Chaubet, "Histoire des intellectuels, histoire intellectuelle: bilan provisoire et perspectives," *Vingtième siècle. Revue d'histoire* 1, no. 101 (2009): pp. 179–90.
9 Stephen Greenblatt, "Cultural Mobility: An Introduction," in *Cultural Mobility: A Manifesto*, ed. Stephen Greenblatt, pp. 1–23 (Cambridge: Cambridge University Press, 2010).
10 Mario Diani, "Social Movements, Contentious Actions, and Social Networks: 'From Metaphor to Substance'?," in *Social Movements and Networks: Relational Approaches to Collective Action,* ed. Mario Diani and Doug McAdam, pp. 1–23 (New York: Oxford University Press, 2003).

11 Michael Werner and Bénédicte Zimmermann, *De la comparaison à l'histoire croisée*, Genre Humain 42 (Paris: Seuil, 2004).
12 Pierre-Yves Saunier, *Transnational History*, Theory and History (New York: Palgrave Macmillan, 2013).
13 Patricia Clavin, "Time, Manner, Place: Writing Modern European History in Global, Transnational and International Contexts," *European History Quarterly* 40, no. 4 (2010): pp. 624–40; Pierre-Yves Saunier, "Les régimes circulatoires du domaine social 1800–1940: projets et ingénierie de la convergence et de la différence," *Genèses* 71, no. 2 (2008): pp. 4–25.
14 Margaret E. Keck and Kathryn Sikkink, *Activists Beyond Borders: Advocacy Networks in International Politics* (Ithaca: Cornell University Press, 1998).
15 Pierre-Yves Saunier, "La secrétaire générale, l'ambassadeur et le docteur. Un conte en trois épisodes pour les historiens du ' monde des causes ' à l'époque contemporaine, 1800–2000," *Monde(s), Histoire, Espaces, Relations* 1, no. 1 (2012): pp. 29–47.
16 Scott Frickel and Neil Gross, "A General Theory of Scientific/Intellectual Movements," *American Sociological Review* 70, no. 2 (2005): pp. 204–32.
17 Sylvain Cuyala, "Mapping the Sources of Diffusion and the Active Movements of Scientists by Using a Corpus of Interviews," *Terra brasilis (nova série). Revista da rede brasileira de história da geografia e geografia histórica*, no. 5 (2015).
18 Robert D. Benford and David A. Snow, "Framing Processes and Social Movements: An Overview and Assessement," *Annual Review of Sociology* 26 (2000): pp. 611–39; Jen I. Allan and Jennifer Hadden, "Exploring the Framing Power of NGOs in Global Climate Politics," *Environmental Politics* 26, no. 4 (2017): pp. 600–20; Jennifer Hadden, *Networks in Contention: The Divisive Politics of Climate Change* (New York: Cambridge University Press, 2015).
19 Charles Camic and Neil Gross, "The New Sociology of Ideas," in *The Blackwell Companion to Sociology*, ed. Judith R. Blau, pp. 236–49 (Oxford: Blackwell Publishing Ltd, 2004).
20 Nick Crossley, *Making Sense of Social Movements* (Buckingham: Open University Press, 2002).
21 David B. Tindall, "Networks as Constraints and Opportunities," in Della Porta; Diani, *The Oxford Handbook of Social Movements*, pp. 231–45; Nick Crossley, "Networks, Interaction, and Conflict: A Relational Sociology of Social Movements and Protest," in *Social Theory and Social Movements: Mutual Inspirations*, ed. Jochen Roose and Hella Dietz, pp. 155–73 (Wiesbaden: Springer Fachmedien, 2016); Florence Passy, "Social Networks Matter: But How?," in *Social Movements and Networks: Relational Approaches to Collective Action,* ed. Mario Diani and Doug McAdam, pp. 21–48 (New York: Oxford University Press, 2003).
22 Mario Diani and Ann Mische, "Network Approaches and Social Movements," in Della Porta; Diani, *The Oxford Handbook of Social Movements*, pp. 306–25; Hadden, *Networks in Contention: The Divisive Politics of Climate Change*; Mario Diani, "Social Movements and Collective Action," in Scott; Carrington, *The Sage Handbook of Social Network Analysis*, pp. 223–35; Ann Mische, *Partisan Publics: Communication and Contention across Brazilian Youth Activist Networks* (Princeton: Princeton University Press, 2008).
23 Naomi Rosenthal et al., "Social Movements and Network Analysis: A Case Study of Nineteenth-Century Women's Reform in New York State," *American Journal of Sociology* 90, no. 5 (1985): pp. 1022–54.
24 Pierre Bourdieu, *Sociology in Question* (London: Sage Publications, 1993).
25 Katherine Giuffre, "Sandpiles of Opportunity: Success in the Art World," *Social Forces* 77, no. 3 (1999): pp. 815–32.
26 Claire Lemercier, "Taking Time Seriously: How Do We Deal with Change in Historical Networks?," in *Knoten und Kanten III: Soziale Netzwerkanalyse in Geschichts-*

und Politikforschung, ed. Marten Düring, Markus Gamper and Linda Reschke, pp. 183–211 (Bielefeld: Transcript Verlag, 2015).
27 Ibid.
28 Mische, *Partisan Publics: Communication and Contention across Brazilian Youth Activist Networks*.
29 Mario Diani and Ann Mische, "Network Approaches and Social Movements," in Della Porta; Diani, *The Oxford Handbook of Social Movements*, pp. 306–25.
30 Donatella Della Porta, "Protest in Social Movements," in *Protest Cultures: A Companion*, ed. Kathrin Fahlenbrach, Martin Klimke and Joachim Scharloth, pp. 13–25 (New York: Berghahn Books, 2016); Donatella Della Porta, "Eventful Protest, Global Conflicts: Social Mechanisms in the Reproduction of Protest," in *Contention in Context: Political Opportunities and the Emergence of Protest*, ed. Jeff Goodwin and James M. Jasper, pp. 256–76 (Stanford: Stanford University Press, 2012).
31 Paul Douglas McLean, *Culture in Networks* (Cambridge: Polity Press, 2017).
32 Paul Douglas McLean, *The Art of the Network: Strategic Interaction and Patronage in Renaissance Florence* (Durham: Duke University Press, 2007); McLean, *Culture in Networks*; Ann Mische, "Partisan Performance: The Relational Construction of Brazilian Youth Activist Publics," in *Social Movement Dynamics: New Perspectives on Theory and Research from Latin America*, ed. Marissa von Bülow and Federico M. Rossi, pp. 43–72 (Farnham: Ashgate Publishing, 2015); Ann Mische, "Relational Sociology, Culture, and Agency," in Scott; Carrington, *The Sage Handbook of Social Network Analysis*, pp. 80–98.
33 Mario Diani and Ann Mische, "Network Approaches and Social Movements," in Della Porta; Diani, *The Oxford Handbook of Social Movements*, pp. 306–25.
34 Marissa von Bülow, *Building Transnational Networks: Civil Society Networks and the Politics of Trade in the Americas* (Cambridge: Cambridge University Press, 2010).
35 Hadden, *Networks in Contention: The Divisive Politics of Climate Change*.
36 Roger V. Gould, "Multiple Networks and Mobilisation in the Paris Commune, 1871," *American Sociological Review* 56, no. 6 (1991): pp. 716–29; Hadden, *Networks in Contention: The Divisive Politics of Climate Change*; Mario Diani, *The Cement of Civil Society: Studying Networks in Localities* (New York: Cambridge University Press, 2009).
37 Michael C. Alexander and James A. Danowski, "Analysis of an Ancient Network: Personal Communication and the Study of Social Structure in a Past Society," *Social Networks* 12, no. 4 (1990): pp. 313–35. Their results show that senators and knights were structurally equivalent.
38 Ulrik Brandes, Natalie Indlekofer and Martin Mader, "Visualization Methods for Longitudinal Social Networks and Stochastic Actor-Oriented Modeling," *Social Networks* 34, no. 3 (2012): pp. 291–308; Ulrik Brandes et al., "Explorations into the Visualization of Policy Networks," *Journal of Theoretical Politics* 11, no. 1 (1999): pp. 75–106.
39 Linton C. Freeman, "Visualizing Social Networks," *Journal of Social Structure* 1, no. 1 (2000): pp. 1–15.
40 Daniel Laqua and Christophe Verbruggen, "Beyond the Metropolis: French and Belgian Symbolists between the Region and the Republic of Letters," *Comparative Critical Studies* 10, no. 2 (2013): pp. 241–58.
41 Jan Fuhse and Mützel Sophie, "Tackling Connections, Structure, and Meaning in Networks: Quantitative and Qualitative Methods in Sociological Network Research," *Quality & Quantity* 45, no. 5 (2011): pp. 1067–89; Mische, *Partisan Publics: Communication and Contention across Brazilian Youth Activist Networks*; Ann Mische, "Cross-Talk in Movements: Reconceiving the Culture-Network Link," in *Social Movements and Networks: Relational Approaches to Collective Action,* ed. Mario Diani and Doug McAdam, pp. 258–80 (New York: Oxford University Press, 2003).

42 Marian-Gabriel Hancean and Matjaž Perc, "Homophily in Coauthorship Networks of East European Sociologists," *Scientific Reports-Nature* 6, no. 36152 (2016).
43 Christopher McCarty et al., "A Comparison of Social Network Mapping and Personal Network Visualization," *Field methods* 19, no. 2 (2007): pp. 145–62.
44 David B. Tindall and Joanna L. Robinson, "Collective Action to Save the Ancient Temperate Rainforest: Social Networks and Environmental Activism in Clayoquot Sound," *Ecology and Society* 22, no. 1 (2017), doi:10.5751/ES-09042-220140; David B. Tindall, "Social Movement Participation Over Time: An Ego-Network Approach to Micro-Mobilization," *Sociological Focus* 37, no. 2 (2004): pp. 163–84.
45 Charles van den Heuvel et al., "Circles of Confidence in Correspondence: Modeling Confidentiality and Secrecy in Knowledge Exchange Networks of Letters and Drawings in the Early Modern Period," *Nuncius* 31, no. 1 (2016): pp. 78–106; Charles van Den Heuvel, "Mapping Knowledge Exchange in Early Modern Europe: Intellectual and Technological Geographies and Network Representations," *International Journal of Humanities and Arts Computing* 9, no. 1 (2015): pp. 95–114; Martin Stuber and Lothar Krempel, "The Scholarly Networks of Albrecht von Haller and the Economic Society: A Multi-Level Network Analysis," *REDES revista hispana para el analisis de redes sociales* 24, no. 1 (2011): pp. 1–25; Laqua and Verbruggen, "Beyond the Metropolis: French and Belgian Symbolists Between the Region and the Republic of Letters," pp. 241–58; Caroline Winterer, "Where Is America in the Republic of Letters?," *Modern Intellectual History* 9, no. 3 (2012): pp. 597–623; Yves Gingras, "Mapping the Structure of the Intellectual Field Using Citation and Co-Citation Analysis of Correspondences," *History of European Ideas* 36, no. 3 (2010): pp. 330–9.
46 Jürgen Osterhammel, *The Transformation of the World: A Global History of the Nineteenth Century* (Princeton: Princeton University Press, 2014).
47 Stéphane Baciocchi, Thomas David and Topalov Christian, eds., *Philanthropes en 1900 (Londres, New York, Paris, Genève)* (Paris: Creaphis editions, 2017); Chris Leonards and Nico Randeraad, "Transnational Experts in Social Reform, 1840–1880," *International Review of Social History* 55, no. 2 (2010): pp. 215–39; Chris Leonards and Nico Randeraad, "Building a Transnational Network of Social Reform in the Nineteenth Century," in Rodogno; Struck; Vogel, *Shaping the Transnational Spere: Experts, Networks and Issues from the 1840s to the 1930s*, pp. 111–31; Christian Topalov, *Laboratoires du nouveau siècle: la nébuleuse réformatrice et ses réseaux en France, 1880–1914* (Paris: Ecole des hautes études en sciences sociales, 1999); Saunier, "La secrétaire générale, l'ambassadeur et le docteur. Un conte en trois épisodes pour les historiens du ' monde des causes ' à l'époque contemporaine, 1800–2000," pp. 29–47.
48 Topalov, *Laboratoires du nouveau siècle: la nébuleuse réformatrice et ses réseaux en France, 1880–1914*.
49 Andrew Jamison et al., *The Making of the New Environmental Consciousness: A Comparative Study of Environmental Movements in Sweden, Denmark and the Netherlands* (Edinburgh: Edinburgh University Press, 1990).
50 Nico Randeraad, "The International Statistical Congress (1853–1876): Knowledge Transfers and Their Limits," *European History Quarterly* 41, no. 1 (2011): pp. 50–65.
51 Eckhardt Fuchs, "Educational Sciences, Morality and Politics: International Educational Congresses in the Early Twentieth Century," *Paedagogica historica* 40, no. 5–6 (2004): pp. 757–84; Damiano Matasci, "International Congresses of Education and the Circulation of Pedagogical Knowledge in Western Europe, 1876–1910," in Rodogno; Struck; Vogel, *Shaping the Transnational Spere: Experts, Networks and Issues from the 1840s to the 1930s*, pp. 218–38.
52 Sidney G. Tarrow, *The New Transnational Activism* (Cambridge: Cambridge University Press, 2005).

53 www.tic.ugent.be (accessed 5 December 2018).
54 https://nodegoat.net (accessed 5 December 2018).
55 Nico Randeraad and Chris Leonards, "Transnational Experts in Social Reform, 1840–1880," *International Review of Social History* 55, no. 2 (2010): pp. 215–39; Chris Leonards and Nico Randeraad, "Building a Transnational Network of Social Reform in the Nineteenth Century," in Rodogno; Struck; Vogel, *Shaping the Transnational Spere: Experts, Networks and Issues from the 1840s to the 1930s*, pp. 111–31; Chris Leonards and Nico Randeraad, "Circulations charitables: les congrès internationaux de réforme sociale," in *Philanthropes en 1900 (Londres, New York, Paris, Genève)*, ed. Stéphane Baciocchi, Thomas David and Topalov Christian (Paris: Creaphis editions, 2017).
56 Made in https://gephi.org (accessed 5 December 2018).
57 Rosenthal et al., "Social Movements and Network Analysis: A Case Study of Nineteenth-Century Women's Reform in New York State," pp. 1022–54.
58 Vincent D. Blondel et al., "Fast Unfolding of Communities in Large Networks," *Journal of Statistical Mechanisms: Theory and Experiment* 10 (2008).
59 Amandine Thiry, Thomas D'haeninck and Christophe Verbruggen, "(Re-)educational Internationalism in the Low Countries, 1850–1914," in *The Civilising Offensive: New Perspectives on Social and Educational Reform in 19th-Century Belgium*, ed. Christoph de Spiegeleer, upcoming (Berlin: De Gruyter, 2018).
60 George Laurent, "Alexis Sluys: un pédagogue engagé au service de l'enseignement officiel en Belgique," *Cahiers bruxellois – Brusselse cahiers* 47, no. 1 (2015): pp. 74–106.
61 Claude Tapia and Jacques Taieb, "Conférences et congrès internationaux de 1815 À 1913," *Relations Internationales* 5 (1976): pp. 11–35; Anne Rasmussen, "Les congrès internationaux liés aux expositions universelles de Paris (1867–1900)," *Mil neuf cent* 7, no. 1 (1989): pp. 23–44; Brigitte Schroeder-Gudehus, *Les congrès scientifiques internationaux* (Paris: SEHRIC, 1990).
62 Jasmien van Daele and Christian Müller, "Peaks of Internationalism in Social Engineering: A Transnational History of International Social Reform Associations and Belgian Agency, 1860–1925," *Revue belge de philologie et d'histoire* 90, no. 4 (2012): pp. 1297–319.
63 Ann Mische, "Cross-Talk in Movements: Reconceiving the Culture-Network Link," in *Social Movements and Networks: Relational Approaches to Collective Action*, ed. Mario Diani and Doug McAdam, pp. 258–80 (New York: Oxford University Press, 2003).
64 Gingras, "Mapping the Structure of the Intellectual Field Using Citation and Co-Citation Analysis of Correspondences," pp. 330–9; Winterer, "Where Is America in the Republic of Letters?," pp. 597–623.
65 Frédéric Vandermoere and Raf Vanderstraeten, "Disciplinary Networks and Bounding: Scientific Communication Between Science and Technology Studies and the History of Science," *Minerva* 50, no. 4 (2012): pp. 451–70.
66 An interesting tool designed for this purpose is Sci2 (https://sci2.cns.iu.edu/ (accessed 5 December 2018).
67 Katy Börner and David E. Polley, *Visual Insights: A Practical Guide to Making Sense of Data* (Cambridge: MIT Press, 2014).
68 Roger V. Gould, "Uses of Network Tools in Comparative Historical Research," in *Comparative Historical Analysis in the Social Sciences*, ed. James Mahoney and Dietrich Rueschemeyer, pp. 241–69 (Cambridge: Cambridge University Press, 2003).
69 Jennifer Edmond, "Collaboration and Infrastructure," in *A New Companion to Digital Humanities*, ed. Susan Schreibman, Ray Siemens and John Unsworth, pp. 54–65 (Chichester: John Wiley & Sons, Ltd, 2016).
70 Charles Wetherell, "Historical Social Network Analysis," *International Review of Social History* 43, no. 6 (1998): pp. 125–44.

71 Bonnie H. Erickson, "Social Networks and History: A Review Essay," *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 30, no. 3 (1997): pp. 149–57.

72 Claire Lemercier, "Formal Network Methods in History: Why and How?," in *Social Networks, Political Institutions, and Rural Societies*, ed. Georg Fertig, Rural History in Europe 11, pp. 281–304 (Turnhout: Brepols Publishers, 2015).

Bibliography

Alexander, Michael C., and James A. Danowski. "Analysis of an Ancient Network: Personal Communication and the Study of Social Structure in a Past Society." *Social Networks* 12, no. 4 (1990): pp. 313–35.

Allan, Jen Iris, and Jennifer Hadden. "Exploring the Framing Power of NGOs in Global Climate Politics." *Environmental Politics* 26, no. 4 (2017): pp. 600–20.

Benford, Robert D., and David A. Snow. "Framing Processes and Social Movements: An Overview and Assessement." *Annual Review of Sociology* 26 (2000): pp. 611–39.

Blondel, Vincent D., Jean-Loup Guillaume, Renaud Lambiotte, and Etienne Lefebvre. "Fast Unfolding of Communities in Large Networks." *Journal of Statistical Mechanisms: Theory and Experiment* 10 (2008).

Börner, Katy, and David E. Polley. *Visual Insights: A Practical Guide to Making Sense of Data*. Cambridge: MIT Press, 2014.

Bourdieu, Pierre. *Sociology in Question*. London: Sage Publications, 1993.

Brandes, Ulrik, Natalie Indlekofer, and Martin Mader. "Visualization Methods for Longitudinal Social Networks and Stochastic Actor-Oriented Modeling." *Social Networks* 34, no. 3 (2012): pp. 291–308.

Brandes, Ulrik, Patrick Kenis, Jörg Raab, Volker Schneider, and Dorothea Wagner. "Explorations into the Visualization of Policy Networks." *Journal of Theoretical Politics* 11, no. 1 (1999): pp. 75–106.

Bülow, Marissa von. *Building Transnational Networks: Civil Society Networks and the Politics of Trade in the Americas*. Cambridge: Cambridge University Press, 2010.

Camic, Charles, and Neil Gross. "The New Sociology of Ideas." In *The Blackwell Companion to Sociology*. Edited by Judith R. Blau, pp. 236–49. Oxford: Blackwell Publishing Ltd, 2004.

Chaubet, François. "Histoire des intellectuels, histoire intellectuelle: bilan provisoire et perspectives." *Vingtième siècle. Revue d'histoire* 1, no. 101 (2009): pp. 179–90.

Clavin, Patricia. "Time, Manner, Place: Writing Modern European History in Global, Transnational and International Contexts." *European History Quarterly* 40, no. 4 (2010): pp. 624–40.

Crossley, Nick. *Making Sense of Social Movements*. Buckingham: Open University Press, 2002.

———. "Networks, Interaction, and Conflict: A Relational Sociology of Social Movements and Protest." In *Social Theory and Social Movements: Mutual Inspirations*. Edited by Jochen Roose and Hella Dietz, pp. 155–73. Wiesbaden: Springer Fachmedien, 2016.

Cuyala, Sylvain. "Mapping the Sources of Diffusion and the Active Movements of Scientists by Using a Corpus of Interviews." *Terra brasilis (nova série). Revista da rede brasileira de história da geografia e geografia histórica*, no. 5 (2015).

Della Porta, Donatella. "Eventful Protest, Global Conflicts: Social Mechanisms in the Reproduction of Protest." In *Contention in Context: Political Opportunities and the Emergence of Protest*. Edited by Jeff Goodwin and James M. Jasper, pp. 256–76. Stanford: Stanford University Press, 2012.

———. "Protest in Social Movements." In *Protest Cultures: A Companion*. Edited by Kathrin Fahlenbrach, Martin Klimke and Joachim Scharloth, pp. 13–25. New York: Berghahn Books, 2016.

Diani, Mario. "Social Movements, Contentious Actions, and Social Networks: 'From Metaphor to Substance'?" In *Social Movements and Networks: Relational Approaches to Collective Action*. Edited by Mario Diani, and Doug McAdam Diani; McAdam, pp. 1–23, New York: Oxford University Press, 2003.

———. *The Cement of Civil Society: Studying Networks in Localities*. New York: Cambridge University Press, 2009.

———. "Social Movements and Collective Action." In Scott; Carrington, *The Sage Handbook of Social Network Analysis*, pp. 223–35.

Diani, Mario, and Ann Mische. "Network Approaches and Asocial Movements." In Della Porta; Diani, *The Oxford Handbook of Social Movements*, pp. 306–25.

Edelstein, Dan. "Intellectual History and Digital Humanities." *Modern Intellectual History* 13, no. 1 (2016): pp. 237–46.

Edmond, Jennifer. "Collaboration and Infrastructure." In *A New Companion to Digital Humanities*. Edited by Susan Schreibman, Ray Siemens and John Unsworth, pp. 54–65. Chichester: John Wiley & Sons, Ltd, 2016.

Erickson, Bonnie H. "Social Networks and History: A Review Essay." *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 30, no. 3 (1997): pp. 149–57.

Freeman, Linton C. "Visualizing Social Networks." *Journal of Social Structure* 1, no. 1 (2000): pp. 1–15.

Frickel, Scott, and Neil Gross. "A General Theory of Scientific/Intellectual Movements." *American Sociological Review* 70, no. 2 (2005): pp. 204–32.

Fuchs, Eckhardt. "Educational Sciences, Morality and Politics: International Educational Congresses in the Early Twentieth Century." *Paedagogica historica* 40, nos. 5–6 (2004): pp. 757–84.

Fuhse, Jan, and Mützel Sophie. "Tackling Connections, Structure, and Meaning in Networks: Quantitative and Qualitative Methods in Sociological Network Research." *Quality & Quantity* 45, no. 5 (2011): pp. 1067–89.

Gingras, Yves. "Mapping the Structure of the Intellectual Field Using Citation and Co-Citation Analysis of Correspondences." *History of European Ideas* 36, no. 3 (2010): pp. 330–9.

Giuffre, Katherine. "Sandpiles of Opportunity: Success in the Art World." *Social Forces* 77, no. 3 (1999): pp. 815–32.

Gould, Roger V. "Multiple Networks and Mobilisation in the Paris Commune, 1871." *American Sociological Review* 56, no. 6 (1991): pp. 716–29.

———. "Uses of Network Tools in Comparative Historical Research." In *Comparative Historical Analysis in the Social Sciences*. Edited by James Mahoney and Dietrich Rueschemeyer, pp. 241–69. Cambridge: Cambridge University Press, 2003.

Greenblatt, Stephen. "Cultural Mobility: An Introduction." In *Cultural Mobility: A Manifesto*. Edited by Stephen Greenblatt, pp. 1–23. Cambridge: Cambridge University Press, 2010.

Hadden, Jennifer. *Networks in Contention: The Divisive Politics of Climate Change*. New York: Cambridge University Press, 2015.

Hancean, Marian-Gabriel, and Matjaž Perc. "Homophily in Coauthorship Networks of East European Sociologists." *Scientific Reports – Nature* 6, no. 36152 (2016).

Jamison, Andrew, Ron Eyerman, Jacqueline Cramer, and Jeppe Laessøe. *The Making of the New Environmental Consciousness: A Comparative Study of Environmental Movements in Sweden, Denmark and the Netherlands*. Edinburgh: Edinburgh University Press, 1990.

Keck, Margaret E., and Kathryn Sikkink. *Activists beyond Borders: Advocacy Networks in International Politics*. Ithaca: Cornell University Press, 1998.

Laqua, Daniel, and Christophe Verbruggen. "Beyond the Metropolis: French and Belgian Symbolists between the Region and the Republic of Letters." *Comparative Critical Studies* 10, no. 2 (2013): pp. 241–58.

Laurent, George. "Alexis Sluys: un pédagogue engagé au service de l'enseignement officiel en Belgique." *Cahiers bruxellois – Brusselse cahiers* 47, no. 1 (2015): pp. 74–106.

Lemercier, Claire. "Formale Methoden der Netzwerkanalyse in den Geschichtswissenschaften: Warum und wie?" *Österreichische Zeitschrift für Geschichtswissenschaft* 23, no. 1 (2012): pp. 16–41.

———. "Formal Network Methods in History: Why and How?" In *Social Networks, Political Institutions, and Rural Societies*. Edited by Georg Fertig, pp. 281–304. Rural History in Europe 11. Turnhout: Brepols Publishers, 2015.

———. "Taking Time Seriously: How Do We Deal with Change in Historical Networks?" In *Knoten und Kanten III: Soziale Netzwerkanalyse in Geschichts- und Politikforschung*. Edited by Marten Düring, Markus Gamper and Linda Reschke, pp. 183–211. Bielefeld: Transcript Verlag, 2015.

Leonards, Chris, and Nico Randeraad. "Transnational Experts in Social Reform, 1840–1880." *International Review of Social History* 55, no. 2 (2010): pp. 215–39.

———. "Building a Transnational Network of Social Reform in the Nineteenth Century." In Rodogno; Struck; Vogel, *Shaping the Transnational Spere: Experts, Networks and Issues from the 1840s to the 1930s*, pp. 111–31.

———. "Circulations charitables: les congrès internationaux de réforme sociale." In *Philanthropes en 1900 (Londres, New York, Paris, Genève)*. Edited by Stéphane Baciocchi, Thomas David and Topalov Christian. Paris: Creaphis editions, 2017.

Matasci, Damiano. "International Congresses of Education and the Circulation of Pedagogical Knowledge in Western Europe, 1876–1910." In Rodogno; Struck; Vogel, *Shaping the Transnational Spere: Experts, Networks and Issues from the 1840s to the 1930s*, pp. 218–38.

McCarty, Christopher, José Luis Molina, Claudia Aguilar, and Laura Rota. "A Comparison of Social Network Mapping and Personal Network Visualization." *Field Methods* 19, no. 2 (2007): pp. 145–62.

McLean, Paul Douglas. *The Art of the Network: Strategic Interaction and Patronage in Renaissance Florence*. Durham: Duke University Press, 2007.

———. *Culture in Networks*. Cambridge: Polity Press, 2017.

Mische, Ann. "Cross-Talk in Movements: Reconceiving the Culture-Network Link." In *Social Movements and Networks: Relational Approaches to Collective Action*. Edited by Mario Diani, and Doug McAdam, pp. 258–80, New York: Oxford University Press, 2003.

———. *Partisan Publics: Communication and Contention across Brazilian Youth Activist Networks*. Princeton: Princeton University Press, 2008.

———. "Relational Sociology, Culture, and Agency." In Scott; Carrington, *The Sage Handbook of Social Network Analysis*, pp. 80–98.

———. "Partisan Performance: The Relational Construction of Brazilian Youth Activist Publics." In *Social Movement Dynamics: New Perspectives on Theory and Research from Latin America*. Edited by Marissa von Bülow, and Federico M. Rossi, pp. 43–72. Farnham: Ashgate Publishing, 2015.

Osterhammel, Jürgen. *The Transformation of the World: A Global History of the Nineteenth Century*. Princeton: Princeton University Press, 2014.

Passy, Florence. "Social Networks Matter: But How?" In *Social Movements and Networks: Relational Approaches to Collective Action*. Edited by Mario Diani, and Doug McAdam, pp. 21–48, New York: Oxford University Press, 2003,.

Pratt, Mary Louise. "Arts of the Contact Zone." *Profession* (1991): pp. 33–40.

Randeraad, Nico. "The International Statistical Congress (1853–1876): Knowledge Transfers and Their Limits." *European History Quarterly* 41, no. 1 (2011): pp. 50–65.

Randeraad, Nico, and Chris Leonards. "Transnational Experts in Social Reform, 1840–1880." *International Review of Social History* 55, no. 2 (2010): pp. 215–39.

Rasmussen, Anne. "Les congrès internationaux liés aux expositions universelles de Paris (1867–1900)." *Mil neuf cent* 7, no. 1 (1989): pp. 23–44.

Rosenthal, Naomi, Meryl Fingrutd, Michele Ethier, Roberta Karant, and David McDonald. "Social Movements and Network Analysis: A Case Study of Nineteenth-Century Women's Reform in New York State." *American Journal of Sociology* 90, no. 5 (1985): pp. 1022–54.

Saunier, Pierre-Yves. "Les régimes circulatoires du domaine social 1800–1940: projets et ingénierie de la convergence et de la différence." *Genèses* 71, no. 2 (2008): pp. 4–25.

———. "La secrétaire générale, l'ambassadeur et le docteur. Un conte en trois épisodes pour les historiens du ' monde des causes ' à l'époque contemporaine, 1800–2000." *Monde(s), Histoire, Espaces, Relations* 1, no. 1 (2012): pp. 29–47.

———. *Transnational History*. Theory and History. New York: Palgrave Macmillan, 2013.

Schroeder-Gudehus, Brigitte. *Les congrès scientifiques internationaux*. Paris: SEHRIC, 1990.

Stuber, Martin, and Lothar Krempel. "The Scholarly Networks of Albrecht von Haller and the Economic Society: A Multi-Level Network Analysis." *REDES revista hispana para el analisis de redes sociales* 24, no. 1 (2011): pp. 1–25.

Tapia, Claude, and Jacques Taieb. "Conférences et congrès internationaux de 1815 À 1913." *Relations Internationales* 5 (1976): pp. 11–35.

Tarrow, Sidney G. *The New Transnational Activism*. Cambridge: Cambridge University Press, 2005.

Thiry, Amandine, Thomas D'haeninck, and Christophe Verbruggen. "(Re-)educational Internationalism in the Low Countries, 1850–1914." In *The Civilising Offensive: New Perspectives on Social and Educational Reform in 19th-Century Belgium*. Edited by Christoph de Spiegeleer. upcoming. Berlin: De Gruyter, 2018.

Tindall, David B. "Social Movement Participation Over Time: An Ego-Network Approach to Micro-Mobilization." *Sociological Focus* 37, no. 2 (2004): pp. 163–84.

———. "Networks as Constraints and Opportunities." In Della Porta; Diani, *The Oxford Handbook of Social Movements*, pp. 231–45.

Tindall, David B., and Joanna L. Robinson. "Collective Action to Save the Ancient Temperate Rainforest: Social Networks and Environmental Activism in Clayoquot Sound." *Ecology and Society* 22, no. 1 (2017). doi:10.5751/ES-09042-220140.

Topalov, Christian. *Laboratoires du nouveau siècle: la nébuleuse réformatrice et ses réseaux en France, 1880–1914*. Paris: Ecole des hautes études en sciences sociales, 1999.

van Daele, Jasmien, and Christian Müller. "Peaks of Internationalism in Social Engineering: A Transnational History of International Social Reform Associations and Belgian Agency, 1860–1925." *Revue belge de philologie et d'histoire* 90, no. 4 (2012): pp. 1297–319.

van den Heuvel, Charles. "Mapping Knowledge Exchange in Early Modern Europe: Intellectual and Technological Geographies and Network Representations." *International Journal of Humanities and Arts Computing* 9, no. 1 (2015): pp. 95–114.

van den Heuvel, Charles, Scott B. Weingart, Nils Spelt, and Henk Nellen. "Circles of Confidence in Correspondence: Modeling Confidentiality and Secrecy in Knowledge Exchange Networks of Letters and Drawings in the Early Modern Period." *Nuncius* 31, no. 1 (2016): pp. 78–106.

Vandermoere, Frédéric, and Raf Vanderstraeten. "Disciplinary Networks and Bounding: Scientific Communication Between Science and Technology Studies and the History of Science." *Minerva* 50, no. 4 (2012): pp. 451–70.

Werner, Michael, and Bénédicte Zimmermann. *De la comparaison à l'histoire croisée.* Genre Humain 42. Paris: Seuil, 2004.

Wetherell, Charles. "Historical Social Network Analysis." *International Review of Social History* 43, no. 6 (1998): pp. 125–44.

White, Richard. "What Is Spatial History?" Stanford University Spatial History Project (2010), https://web.stanford.edu/group/spatialhistory/cgi-bin/site/pub.php?id=29 (accessed 6 February 2020).

Winterer, Caroline. "Where is America in the Republic of Letters?" *Modern Intellectual History* 9, no. 3 (2012): pp. 597–623.

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Computational extraction of network data from large corpora